

REMARKS

Claims 9-24 are pending in this application. Claim 23 is presently withdrawn from consideration. By this Amendment, claim 9 is amended to invoke 35 U.S.C. §112, sixth paragraph. Claim 24 is newly added. Support for claim 24 can be found throughout the original specification at, for example, claim 9. The title is amended to further indicate the subject matter of the application. No new matter is added.

In view of the foregoing amendments and the following remarks, reconsideration and allowance of claims 9-24 are respectfully requested.

Interview

Applicant appreciates the courtesies shown to Applicant's representative by Examiner Han in the October 15, 2009 interview. Applicant's separate record of the substance of the interview is incorporated into the following remarks.

Objection To The Title

The title was objected to for allegedly not being descriptive.

The title is amended to further indicate the subject matter of the application. The title is descriptive.

Withdrawal of the objection is respectfully requested.

35 U.S.C. §112 Rejection

Claim 20 was rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. In particular, the Patent Office alleges that the term "monotonously" is indefinite.

The term monotonous is definite. For example, the specification describes that the term "monotonously" refers to a gradual, uniform, increase or decrease in the revolution speed of the hydrogen pump. See page 17, line 25 to page 18, line 10 of the specification.

Thus term "monotonous" as recited in claim 20, is definite to one of ordinary skill in the art.

In view of the above, withdrawal of the rejection is respectfully requested.

35 U.S.C. §103(a) Rejections

Claims 9-22 were rejected under 35 U.S.C. §103(a) as allegedly having been obvious over Yang (U.S. Patent Application Publication No. 2003/0203258) in view of Iio (U.S. Patent No. 6,663,990). Applicant respectfully traverses this rejection.

Amended claim 9 requires, among other features, a control means for controlling a drive quantity of the drive means and variably regulating the pressure regulating means, wherein the control means makes up a deficiency of the fuel gas according to a variation of a required gas quantity required in the fuel cell by regulating a pressure of the fuel gas in the circulation route with the pressure regulating means, while inhibiting a variation of the drive quantity in the drive means. These features of claim 9 provide benefits, such as allowing the quantity of fuel to be regulated by pressure variations of the fuel gas in a range with a high required gas quantity. Thus, the drive quantity of the drive means can be reduced, and the power consumption of the drive means, which tends to increase remarkably when the load is high, can also be reduced. See, for example, page 3, lines 11-18, of the specification.

The combination of Yang and Iio does not render obvious the above features of claim 9, or the benefits associated therewith.

Yang describes a flow and pressure regulating device 220 that comprises a solenoid valve 246 and pressure regulating valve 248. Yang describes that the solenoid valve 246 is controlled by a control circuit 244 such that it is selectively turned on or off for the flowing of the hydrogen from the hydrogen storage 218, and that the pressure regulating valve 248 regulates the pressure of the hydrogen flowing through the solenoid valve 246. Yang controls the pressure so that excessive hydrogen pressure is avoided in order to prevent damage occurring to the fuel cell from excessive hydrogen pressure. See paragraph [0024] of Yang.

Yang describes that the control circuit 244 controls the operation of the flow and

pressure regulating device 220 to regulate the hydrogen flowing into the fuel cells stack 202.

The control circuit 244 of Yang also controls the blower 206 to control air flowing through the air humidifier 216, the exhaust valve 266 to expel impurities and water from the fuel stack 202 and the coolant pump 210 to circulate coolant through the fuel stack. Yang does not describe controlling a drive means in any way.

Yang does not describe a controller that controls a drive quantity of the drive means. Thus, Yang does not describe a control means that makes up a deficiency of the fuel gas according to a variation of a required gas quantity required in the fuel cell by regulating a pressure of the fuel gas in the circulation route with the pressure regulating means, while inhibiting a variation of the drive quantity in the drive means.

Iio does not remedy the above deficiencies of Yang. Iio describes a fuel cell system including a control unit 5 that controls a hydrogen control valve 11 such that the opening degree is increased to purge moisture in the fuel cell stack. See the Abstract of Iio. Iio describes that the hydrogen control valve 11 and the drawing power of the hydrogen draw pump 12 are controlled by the control unit 5 so that moisture remaining in the fuel stack 1 is purged at a desired flow rate. See col. 4, lines 25-29 of Iio. Iio describes that in step S1-9 the control unit 5 increases the drawing power of the hydrogen draw pump 12 by an amount equal to a value corresponding to the pressure losses caused by the hydrogen control valve 11. In step S1-11, Iio describes that the drawing power of the hydrogen draw pump 12 is brought back down to its original level and in step S1-12 the flow rate of hydrogen gas to be exhausted is increased so that water is purged from the Iio system. See col. 5, line 43 to col. 6, line 2. In other words, Iio overdrives the hydrogen draw pump to increase the hydrogen pressure, and then instantaneously opens a valve to allow the excess pressure to purge water from the system.

Iio does not describe a control means that makes up a deficiency of the fuel gas according to a variation of a required gas quantity required in the fuel cell by regulating a pressure of the fuel gas in the circulation route with the pressure regulating means, while inhibiting a variation of the drive quantity in the drive means. Thus, Iio does not remedy the deficiencies of Yang.

In view of the above, the combination of Yang and Iio would not have rendered obvious at least the feature of claim 9 requiring a control means for controlling a drive quantity of the drive means and variably regulating the pressure regulating means, wherein the control means makes up a deficiency of the fuel gas according to a variation of a required gas quantity required in the fuel cell by regulating a pressure of the fuel gas in the circulation route with the pressure regulating means, while inhibiting a variation of the drive quantity in the drive means.

In addition, the control unit 5 of Iio cannot operate to control one of the hydrogen draw pump 12 and the control valve 11 while inhibiting the other because the control valve 11 and the hydrogen draw pump 12 are connected in series. Thus, in order to increase the supply of hydrogen gas, both the drawing power of the hydrogen draw pump 12 and the opening of the control valve 11 would need to be increased. Conversely, to decrease the supply of hydrogen gas, both the drawing power of the hydrogen draw pump 12 and the opening of the control valve 11 of Iio would need to be decreased. Thus, Iio is very different from claim 9, which requires the control means to make up a deficiency of the fuel gas according to a variation of a required gas quantity required in the fuel cell by regulating a pressure of the fuel gas in the circulation route with the pressure regulating means (disposed between the fuel gas supply and the circulation route), while inhibiting a variation of the drive quantity in the drive means. For this additional reason, the combination of Iio and Yang would not have rendered obvious claim 9.

Claims 10-22 depend from claim 9. For at least their respective dependency, and for the additional features recited, the combination of Yang and Iio also would not have rendered obvious claims 10-22.

New Claim 24

The fuel cell system of new claim 24 requires features similar to those of claim 9, but does not invoke 35 U.S.C. §112, sixth paragraph. For example, claim 24 requires a controller wherein the controller controls a drive quantity of the drive device and variably regulates the pressure regulator, wherein the controller makes up a deficiency of the fuel gas according to a variation of a required gas quantity required in the fuel cell by regulating a pressure of the fuel gas in the circulation route with the pressure regulator while inhibiting a variation of the drive quantity in the drive device.

For at least the above reasons regarding claim 9, the combination of Yang and Iio also would not have rendered obvious claim 24.

Rejoinder

Applicant respectfully requests rejoinder of claim 23 upon allowance of claims 9-22 and 24.

Concluding Remarks

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 9-24 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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